

Bull. Natn. Sci. Mus., Ser. A (Zool.), 3 (3), September 22, 1977

Five New Species of Chirostylid Crustaceans (Decapoda, Anomura) from off Midway Island

By

Keiji BABA

Biological Laboratory, Faculty of Education, Kumamoto University, Kumamoto

(Communicated by Yoshinori IMAIZUMI)

Recently I received from Dr. Masatsune TAKEDA of the National Science Museum, Tokyo, a number of specimens of the Chirostylidae for identification. They were all taken off Midway Island, one of the Hawaiian Islands, in a depth of 700–800 m, by the Nippon Suisan Co. Ltd. (Japanese Fisheries Co. Ltd.). Since no record is available of the chirostylids from the Hawaiian Islands, they seemed at first to be most interesting. In fact examination revealed that they were all new to science, representing 5 new species, as designated here as *Gastroptychus hawaiiensis* sp. nov., *Uroptychus magnispinatus* sp. nov., *U. setosidigitalis* sp. nov., *U. similis* sp. nov., and *Eumunida debilistriata* sp. nov.

I thank Dr. Masatsune TAKEDA for providing me with this interesting collection, and Dr. K. K. TIWARI of the Zoological Survey of India for loaning the syntype of *Uroptychus indicus* ALCOCK.

Gastroptychus hawaiiensis sp. nov.

(Figs. 1–2)

Material. Holotype: male, NSMT–Cr. 4354, off Midway I., 32–35° N, 172°45'–172°50' W, 700–800 m deep, March–May 1972, coll. Nippon Suisan Co. Ltd.

Description of holotype. Carapace, including distinct rostrum, nearly twice as long as its greatest breadth. Dorsal surface moderately convex, subdivided into regions with more or less deeper concavities; spination as illustrated. Gastric region feebly convex, with 3 pairs of rather stout spines, all placed laterally. Cardiac region most distinctly circumscribed, with 2 pronounced dorsal spines. Two intestinal spines stout. Rather small spines on branchial region. Posterior ridge raised, with well-developed 3 median and 2 lateral spines; 3 small spines nearer posterior margin. Lateral margins convex at posterior 3rd, distinctly concave in front of posterior margin; anterior half with 4 (left) or 5 (right) spines, anteriormost somewhat smaller, anterior 2nd minute, 3rd largest; 3 or 4 spinules on posterior half.

Rostrum well developed, broadened at base, spiniform distally, slightly curving upward, 2/5 of remaining carapace length. Outer orbital angle rounded.

Pterygostomial flap also spinose; pronounced spine on anterior upper margin near pleural suture on right side, 2 spinules on left.

Abdomen spinose as illustrated; 1st segment posteriorly raised, with transverse row of spines; 2nd and 3rd segments with anterior and posterior transverse convexities, each with short but stout spines; no distinct convexity on following segments; pleura of 2nd, 3rd, and 4th segments tapering; telson laterally constricted at middle.

Eyes comparatively small, but distinct, slightly dilated distally.

Antennule with short, rounded stylocerite, but otherwise smooth on basal segment. Antennae slightly shorter than carapace excluding rostrum; distal 2 segments of peduncle with outer distal marginal spine; proximal 2nd segment with prominent spine externally; antennal scale rudimentary.

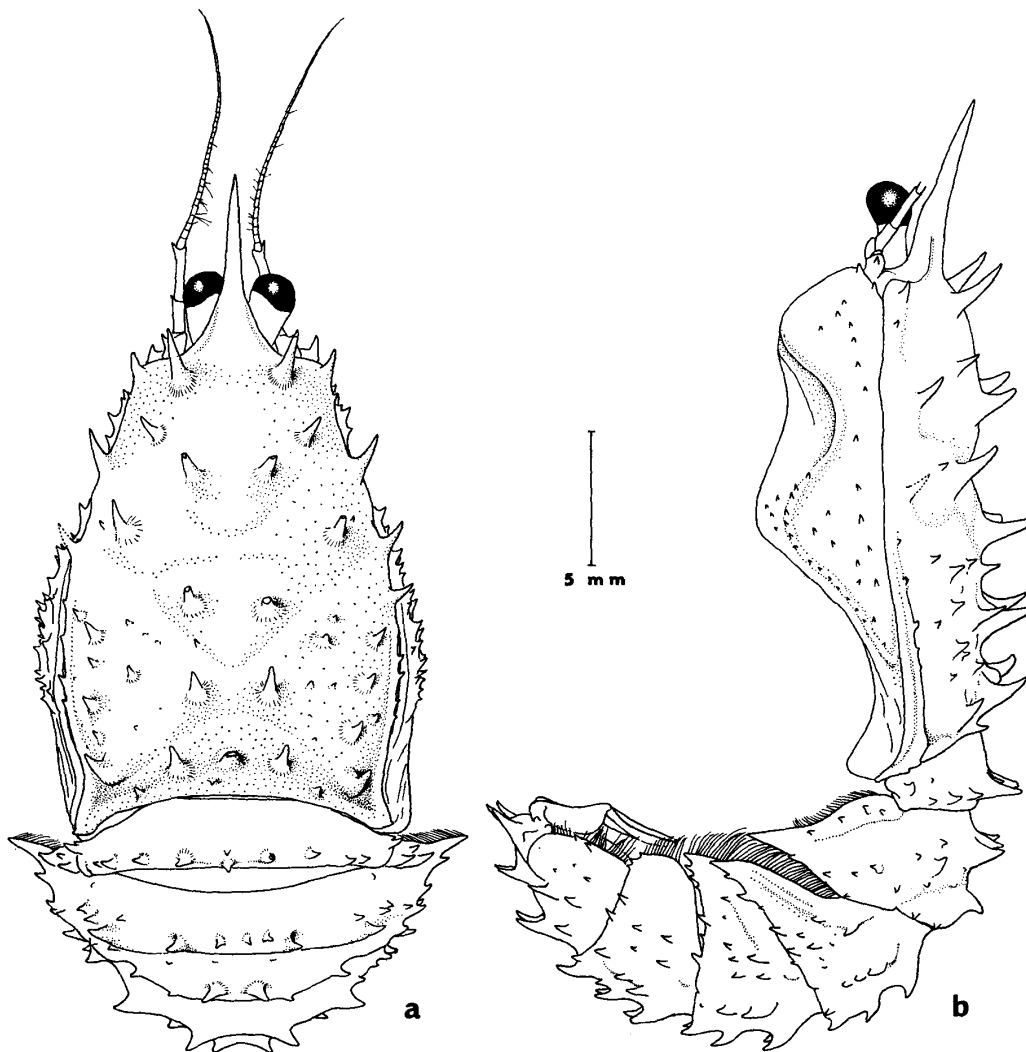


Fig. 1. *Gastroptychus hawaiiensis* sp. nov., holotype; a, carapace and abdomen, dorsal view, legs omitted; b, same, lateral view.

Third maxilliped with well-developed coxal and ischial spines; ischium with 16 (left) or 15 (right) well-developed denticles on cutting edge and small inner distal marginal spine. Outer distal margin of merus produced moderately. Carpus with 3 outer marginals, distal stout, proximal two small. Propodus unarmed, shorter than merus.

Sternum of 3rd thoracic somite with pair of small spines on anterior part of surface, anterior margin produced at middle and concave on both sides of its median process. Two large lateral marginal spines on following sternum, outer extremely large; 2 longitudinal rows of spines on surface, separated by more or less deeper groove, left row consisting of 3 spines and 1 tubercle, right of 2 spines; basal of each largest.

Chelipeds cylindrical, spinose, distally furnished with coarse setae sparsely, slightly more than 5 times as long as carapace. Fingers curving outward, distinctly gaping medially, tips directed inward; cutting edge tuberculate prominently and densely furnished with fine setae on gaping portion, with rather large proximal process on each side; several spinules on dorsal surface of immovable finger; movable finger with few dorsal, marginal and ventral spines. Palm about twice as long as finger, 12 times as long as broad, with 6 longitudinal rows of pronounced spines (2 dorsal, 2 ventral, and 2 lateral), another row of several spinules on anterior part of ventral surface. Wrist as long as preceding segment; spination similar to that of palm. Arm also similar in arrangement of spines to preceding; but many spinules interspersed with more or less pronounced spines. Dorso-distal spine on basi-ischium, ventro-inner distal spine on coxa, both well developed.

Walking legs slender, spinous, 7/10 of cheliped length, distinctly overreaching distal end of wrist of cheliped, when expanded. Five rows of well-developed spines interspersed with spinules on merus. Carpus especially spinose on outer margin, several small spines on dorso-ventral surfaces and inner margin. Propodus about 3 times as long as dactylus, longest in 3rd leg, shortest in 1st, distally sparsely setose; outer margin with more than 20 acute, small spines excepting distal 1/7; inner margin with slender movable spinelets, especially close to one another on distal 3rd, and few immovable spinules on proximal portion; row of several spines on dorsal and ventral surfaces. Dactylus distally curving inward, furnished with short setae on entire surface; 8 movable inner marginal spines decreasing in size proximally.

First 2 pleopods as copulatory organ. Endopod of 1st pleopod thin, elongate, dorsally deeply concave, with dorsal flap curved back over concave surface. Endopod of 2nd pleopod setose distally and posteriorly, widened distally, with setose dorsal projection.

Measurements of holotype (mm).

Length of carapace including rostrum	24.8
Breadth of carapace	13.0
Length of cheliped	139.3 (left) 142.2 (right)
Length of wrist	32.9 33.0

Length of palm	.....	32.8		34.2
Breadth of palm	.....	2.7		2.9
Length of finger	.....	14.9		15.6
Length of right walking leg		I	II	III
Coxa and basi-ischium	.....	9.2	9.3	9.5
Merus	.....	40.2	38.6	40.3
Carpus	.....	19.6	19.5	18.0
Propodus	.....	23.5	24.7	27.8
Dactylus	.....	7.7	7.7	7.7

Remarks. *Gastroptychus hawaiiensis* sp. nov. is somewhat related to *G. hendersoni* (ALCOCK et ANDERSON) from off the Kerala and South Arabian coasts, from which it differs in the following: 1) The gastric region of the carapace has 3 pairs of rather stout spines in the former, while in the latter another median spine is added; 2) the 3rd abdominal segment is devoid of dorsal spines except those at junction with pleura in *G. hendersoni*, whereas the same segment has several stouter spines dorsally in the new species.

I have examined a female of *G. hendersoni* taken at "Albatross" Station 5603 (Philippines) in the collection of the Smithsonian Institution. It has the antenna without distinct spine on the distal outer margin of the proximal 2nd segment; however, in this new species the 2nd antennal segment has a prominent outer distal marginal spine.

ALCOCK (1901) defined in the key that the 1st segment of the telson in *G. hendersoni* is not much more than half the antero-posterior diameter of the 2nd segment. It is likely to be true in the "Albatross" specimen, the ratio of the anterior segment to the posterior represented by 23:34. These 2 segments are, however, almost of equal length in the new species.

***Uroptychus magnispinatus* sp. nov.**

(Figs. 3-4)

Material. Holotype: ovigerous female, NSMT-Cr. 4359, off Midway I., 32-35° N, 172°45'-172°50' W, 700-800 m deep, March-May 1972, coll. Nippon Suisan Co. Ltd.

Description of holotype. Carapace slightly broader than long, excluding rostrum. Lateral margins subparallel, slightly converging anteriorly, with extremely large spine at ordinary end of cervical groove, followed behind by 5 (right) or 3 (left) small spines; anterolateral spine rather developed; 2 minute but distinct spines between anterolateral and large spines. Dorsal surface covered with short fine setae moderate in density; no distinct areas. Moderate-sized spine just behind orbital margin on right side, no spine on left, only leaving rudiment; another dorsal spinule nearer large lateral. Weak ridge along posterolateral margin. Outer orbital angle produced moderately.

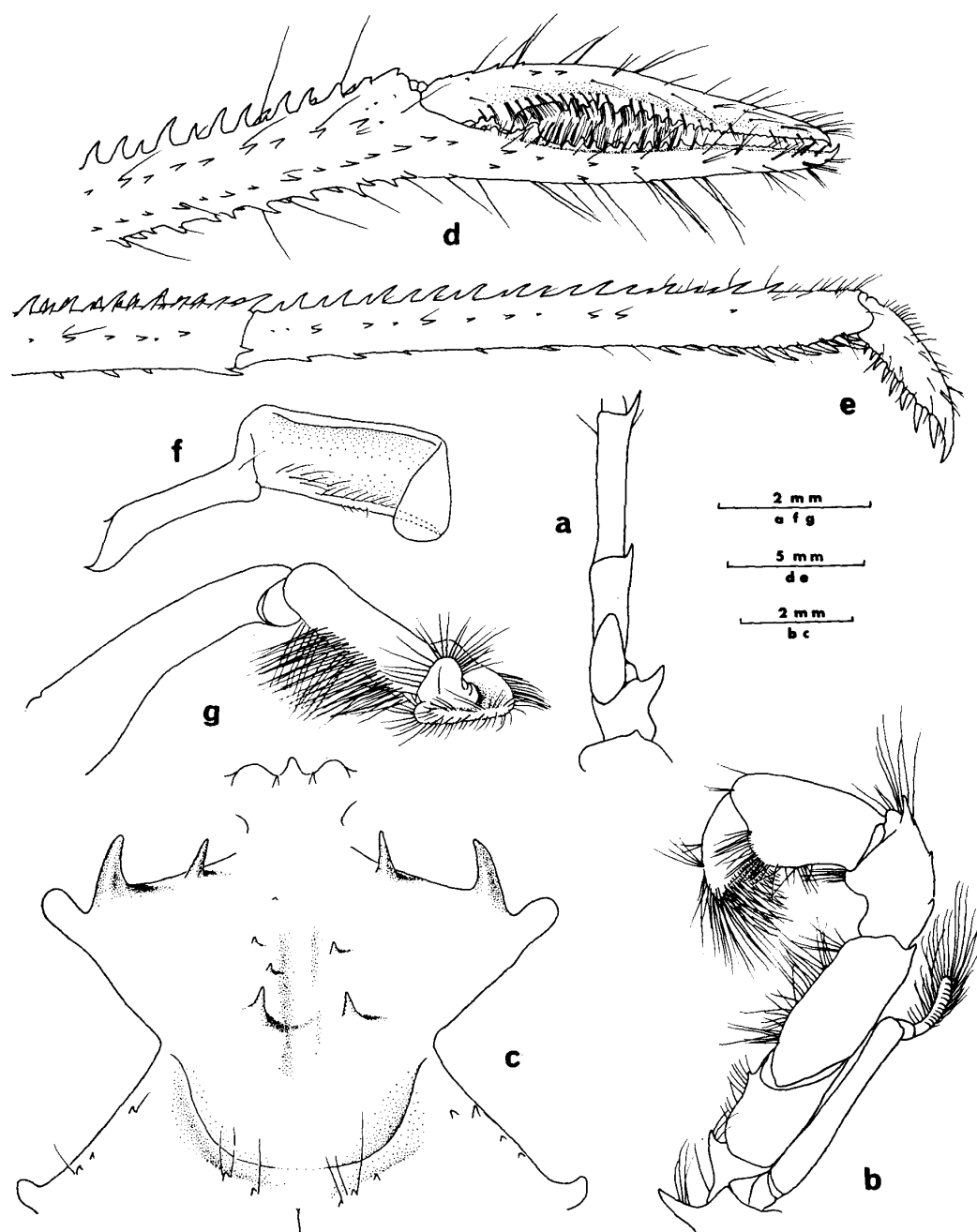


Fig. 2. *Gastroptychus hawaiiensis* sp. nov., holotype; a, left antennal peduncle, ventral view; b, left 3rd maxilliped; c, anterior part of sternal segments; d, distal part of right cheliped, dorsal view; e, distal segments of right 1st walking leg; f, 1st pleopod, dorsal view; g, 2nd pleopod, dorsal view.

Rostrum comparatively broad at base, triangular, covered with short fine setae, measuring $2/3$ of remaining carapace length.

Eyestalk slender, elongate, reaching middle of rostrum.

Abdomen unarmed, entire surface covered with short fine setae.

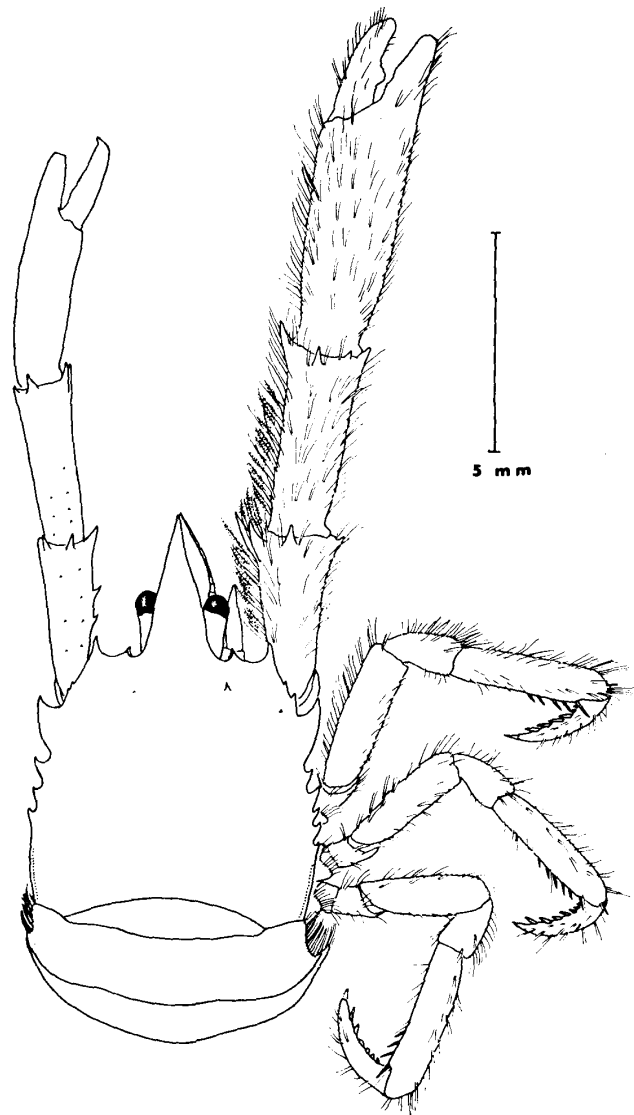


Fig. 3. *Uroptychus magnispinatus* sp. nov., holotype, dorsal view, short fine setae on carapace and abdomen omitted.

Antennal peduncle comparatively slender, ultimate segment twice as long as penultimate when measured on inner margin; both segments with small internal terminal spine. Proximal 2nd segment unarmed. Antennal scale slightly broader than peduncle, reaching distal end of ultimate peduncular segment, sparsely setose externally and distally.

Third maxilliped moderately setose. Merus narrower but longer than ischium; outer terminal margin produced. Distinct spine on outer distal margin of carpus.

Anterior part of sternal segments as illustrated, setose on surface and margins, anteriormost segment not distinctly lowered. Anterior margin concave, almost V-shaped.

Right cheliped longer and stouter than left, about twice as long as carapace including rostrum; thickly covered with fine setae. Arm with 5 distal marginal spines, inner 2 of them strong; 2 extra spines on ventro-inner margin. Wrist shorter than palm, with 5 distal marginal spines; several spinules also on dorsal surface and inner margin. Palm unarmed, more or less massive, less than 3 times as long as broad. Fingers distally broken, only slightly gaping, half as long as palm; rounded process on cutting edge of movable finger. Left cheliped similar to right in armature, but several tubercular spinules additionally present on dorsal surface of arm and wrist; palm about 3 times as long as broad; fingers straight, not gaping; cutting edge of movable finger slightly convex on proximal portion; tip curving inward.

Walking legs similar, moderately depressed, especially setose marginally; those setae on merus plumose; 5 or 6 movable spinelets on distal half of inner margin of propodus. Dactylus more than half of propodus, gently but distinctly curving inward, distally sharpened; 6 or 7 inner marginal spines comparatively large, decreasing in size toward base of segment.

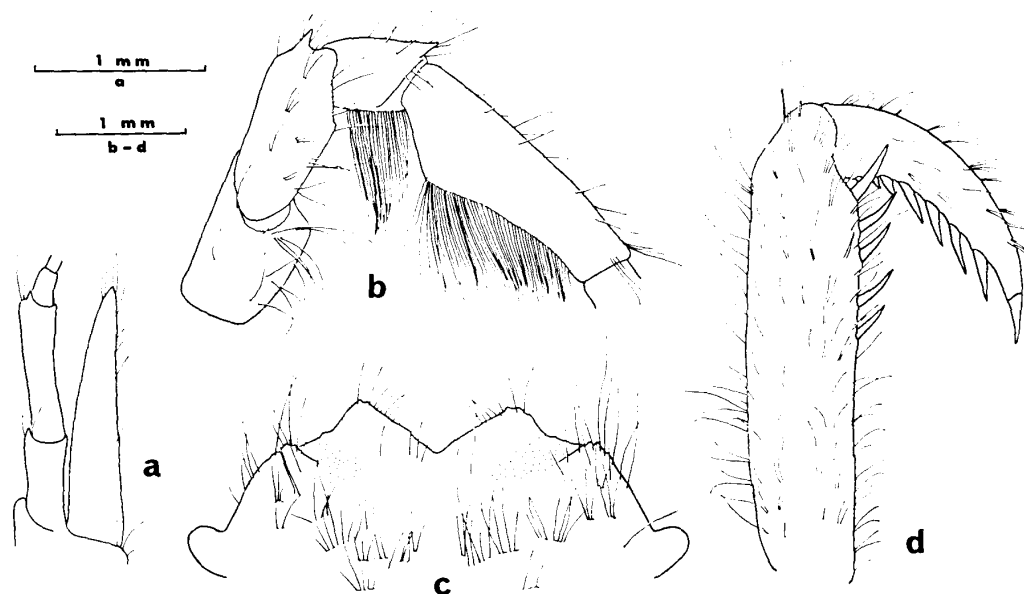


Fig. 4. *Uroptychus magnispinatus* sp. nov., holotype; a, left antennal peduncle, ventral view; b, endopod of left 3rd maxilliped; c, anterior part of sternal segments; d, distal segments of right 1st walking leg.

Measurements of holotype (mm).

Length of carapace	9.6
Breadth of carapace	6.9
Length of cheliped	16.9 (left) 19.2+ (right)
Length of wrist	4.0 4.4
Length of palm	4.2 6.0
Breadth of palm	1.5 2.3

Length of finger	2.9	3.1+	
Diameter of ovum			1.4

Remarks. No near relatives have appeared so far in the Indo-Pacific region. The spinosity of the lateral margin of the carapace in this new species somewhat resembles that of the *Uroptychus spinimarginatus* group (BABA, 1977), but is distinct in having no slender 1st walking leg.

Uroptychus setosidigitalis sp. nov.

(Figs. 5–6)

Material. Holotype: ovigerous female, NSMT–Cr. 4357, off Midway I., 32–35°N, 172°45'–172°50' W, 700–800 m deep, March–May 1972, coll. Nippon Suisan Co. Ltd. Paratypes: 1 ovigerous female and 1 non-ovigerous female, NSMT–Cr. 4358, collected with holotype.

Description of holotype. Body covered with very fine setae on entire surface. Carapace excluding rostrum wider than long, slightly convex dorsally, without spines and grooves. Lateral margins posteriorly diverging, greatly convex at posterior 1/5. Anterolateral angle triangular, furnished anteriorly with short plumose setae. Outer orbital angle distinct, moderately produced.

Rostrum flat, comparatively broad, triangular, weakly ridged ventrally, and less than half of remaining carapace length.

Abdomen unarmed. Eyes small, cornea reaching middle of rostrum.

Distal 2 segments of antennal peduncle unarmed, furnished with plumose setae distally; ultimate more than twice as long as penultimate when measured on inner margin; antennal scale slightly wider and shorter than peduncle, with tuft of terminal plumose setae; outer margin of proximal 2nd segment produced to form small but distinct spine.

Third maxilliped very setose; merus nearly as broad as, but longer than, ischium; all segments smooth and unarmed.

Anterior part of sternal segments as illustrated; surface setose, not deeply sinking on 3rd thoracic segment; anterior margin strongly concave, almost V-shaped.

Chelipeds similar, subcylindrical, moderately depressed distally, 3 times as long as carapace, thickly covered with setae on entire surface, and devoid of spines. Palm slightly longer than wrist and nearly 4 times as long as broad; right palm slightly broader. Fingers gaping moderately, distinctly more than 1/3 of length of palm; distally curving inward; more or less pronounced process on cutting edge of movable finger coinciding to between 2 weak eminences on that of immovable finger.

Walking legs similar; furnishment of setae as in cheliped; moderately wide and depressed, no spine on merus and carpus. Inner margin of propodus devoid of spinelets, but with dense set of short setae instead. Dactylus 2/3 as long as propodus, strongly curving inward at proximal 1/3, ending in small spine; inner margin with about

20 short spines, all hidden under densely furnished setae.

Measurements of holotype (mm).

Length of carapace	8.9
Breadth of carapace	7.7
Length of cheliped	26.0 (left) 25.6 (right)
Length of wrist	7.0 6.7
Length of palm	8.5 8.5
Breadth of palm	2.2 2.6
Length of finger	3.2 3.1
Diameter of ovum	1.1×1.0

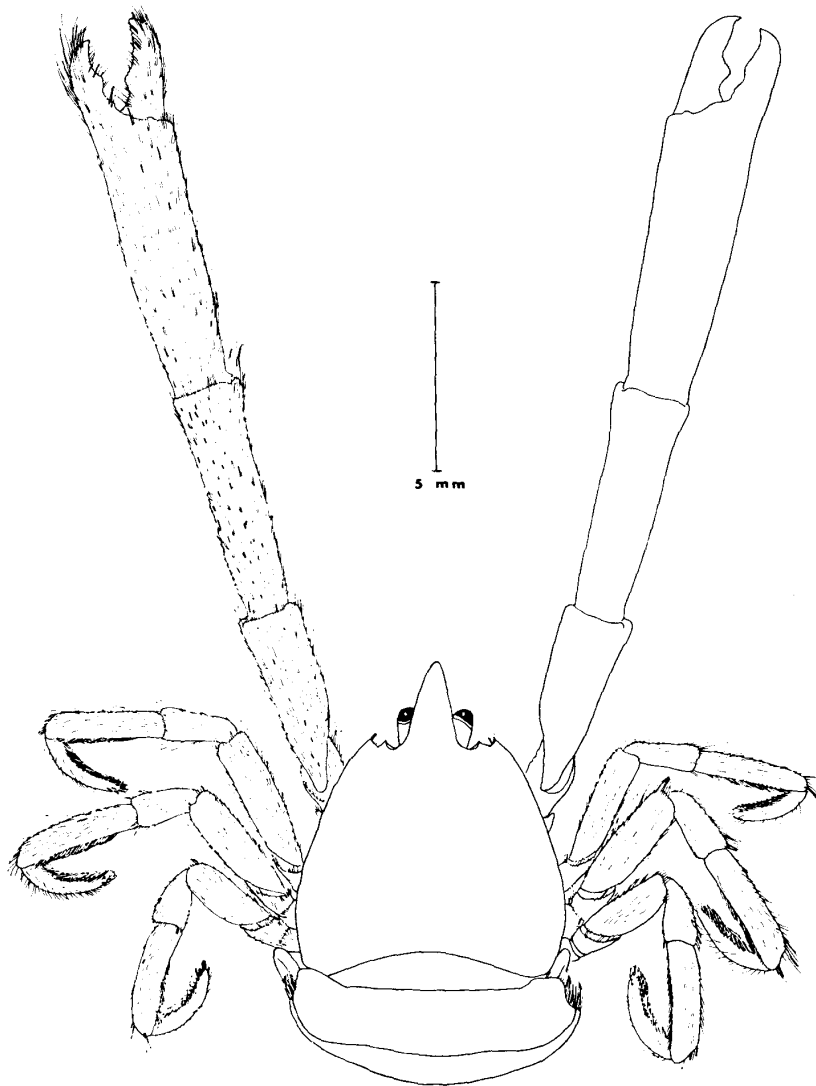


Fig. 5. *Uroptychus setosidigitalis* sp. nov., holotype, dorsal view, fine setae on carapace and abdomen omitted.

Measurements of paratypes (mm). Ovigerous female: Length of carapace, 7.7; breadth of carapace, 7.5; length of cheliped, 25.4 (left), 20.8 (right); diameter of ovum, 1.1×1.2 . Non-ovigerous female: Length of carapace, 4.7; breadth of carapace, 3.8; length of cheliped, 11.4 (right).

Variation. In the ovigerous paratype the rostrum more sharply ends than it does in the holotype as well as non-ovigerous paratype. Length of antennal scale is variable; it is shorter than the peduncle and distinctly extends beyond the middle of the ultimate segment in the holotype, almost equal to the peduncle in the ovigerous paratype, and in the non-ovigerous female it terminates in the middle of the ultimate segment.

Sternal segments in the non-ovigerous female are less setose than in other 2 ovigerous females; those in the ovigerous paratype the setae are much more densely beset, almost finely plumose. Inner marginal spines of the dactylus of the walking leg are more likely to be variable, numbering 13–20.

Remarks. This new species is closely related to *Uroptychus onychodactylus* TIRMIZI, 1964, from the Maldives in depths of 786–1,463 m. Although there is no trenchant character to separate these 2 species, I am inclined to believe that some of the differences noted below are constant. *Uroptychus onychodactylus* has a more distinctly concave orbital margin; the basal antennal segment is illustrated to have no spine on the outer distal margin. In addition, the Maldives species possesses the cheliped with fingers most distinctly directed outward, whereas in this new species, based on the types including fully matured specimens as in *U. onychodactylus*, there is no evidence of such an outward curving.

***Uroptychus similis* sp. nov.**

(Figs. 7–8)

Material. Holotype: ovigerous female, NSMT–Cr. 4355, off Midway I., 32–35°N, 172°45′–172°50′ W, 700–800 m deep, March–May 1972, coll. Nippon Suisan Co. Ltd. Paratype: 1 ovigerous female, NSMT–Cr. 4356, collected with holotype.

Description of holotype. Carapace slightly longer than broad, excluding rostrum. Dorsal surface smooth, devoid of setae, medially slightly concave, posterolaterally feebly ridged. Lateral margins slightly diverging posteriorly, anterolateral angle moderately produced. Outer orbital angle pyramidal, only slightly produced.

Rostrum comparatively broad at base, distinctly more than 1/3 as long as remaining carapace, slightly curving downward.

Abdomen also smooth, without setae dorsally. Eyes reaching distal 3rd of rostrum.

Ultimate segment of antennal peduncle more than 3 times as long as penultimate when measured on inner margin; both segments unarmed. Antennal scale broader basally than peduncle, falling short of distal margin of ultimate segment; outer distal margin of basis produced.

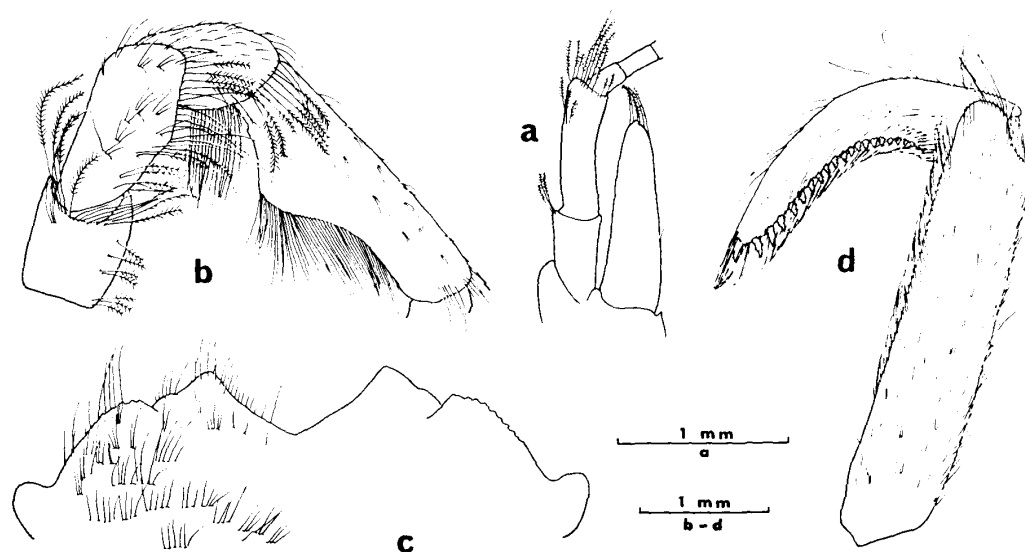


Fig. 6. *Uroptychus setosidigitalis* sp. nov., holotype; a, left antennal peduncle, ventral view; b, endopod of left 3rd maxilliped; c, anterior part of sternal segments; d, distal segments of left 1st walking leg.

All segments of 3rd maxilliped unarmed.

Anterior part of sternal segments as illustrated; 3rd thoracic sternite bearing 3rd maxilliped lowered; setose anterior margin greatly concave, with pair of pronounced median spines; blunt but distinct process on outer margin. Following sternum with coarse long setae on both surface and anterolateral margin minutely dentate; distinct transverse ridge on posterior 3rd separated by more or less deeper groove.

Right cheliped slightly longer and more massive, barely 3 times as long as carapace, without any spine on all segments. Small, thin knob on dorsal surface of ischium. Palm 2.6–2.7 times as long as broad, moderately depressed, slightly shorter than wrist; these 2 segments almost naked but few short setae on inner distal margin of wrist. Fingers depressed, extremely setose, about half as long as palm; dentate cutting edge of movable finger with well-developed proximal process in right cheliped, but slightly convex proximally in left; that of immovable finger slightly convex medially.

Walking legs similar, with long coarse setae particularly thick on distal 2 segments. Propodus twice as long as dactylus, with 7 or 8 long movable spinelets on inner margin. Dactylus curved inward, distally spined; 10 inner marginal spines shorter but stouter than those of preceding segment, gradually decreasing in size toward base of segment.

Measurements of holotype (mm).

Length of carapace	.....	15.8
Breadth of carapace	.....	11.0
Length of cheliped	..... 44.5 (left)	45.2 (right)
Length of wrist	..... 14.7	13.8
Length of palm	..... 10.0	12.2

Breadth of palm	3.8	4.6
Length of finger	5.5	5.6
Diameter of ovum		1.5

Measurements of paratype (mm). Length of carapace, 14.7; length of cheliped, 41.4 (left).

Remarks. This species seems to be most closely related to *Uroptychus indicus* ALCOCK from the Indian Ocean and *U. nitidus occidentalis* FAXON from the Gulf of Panama and Japan, in having the carapace with smooth surface and margin, and

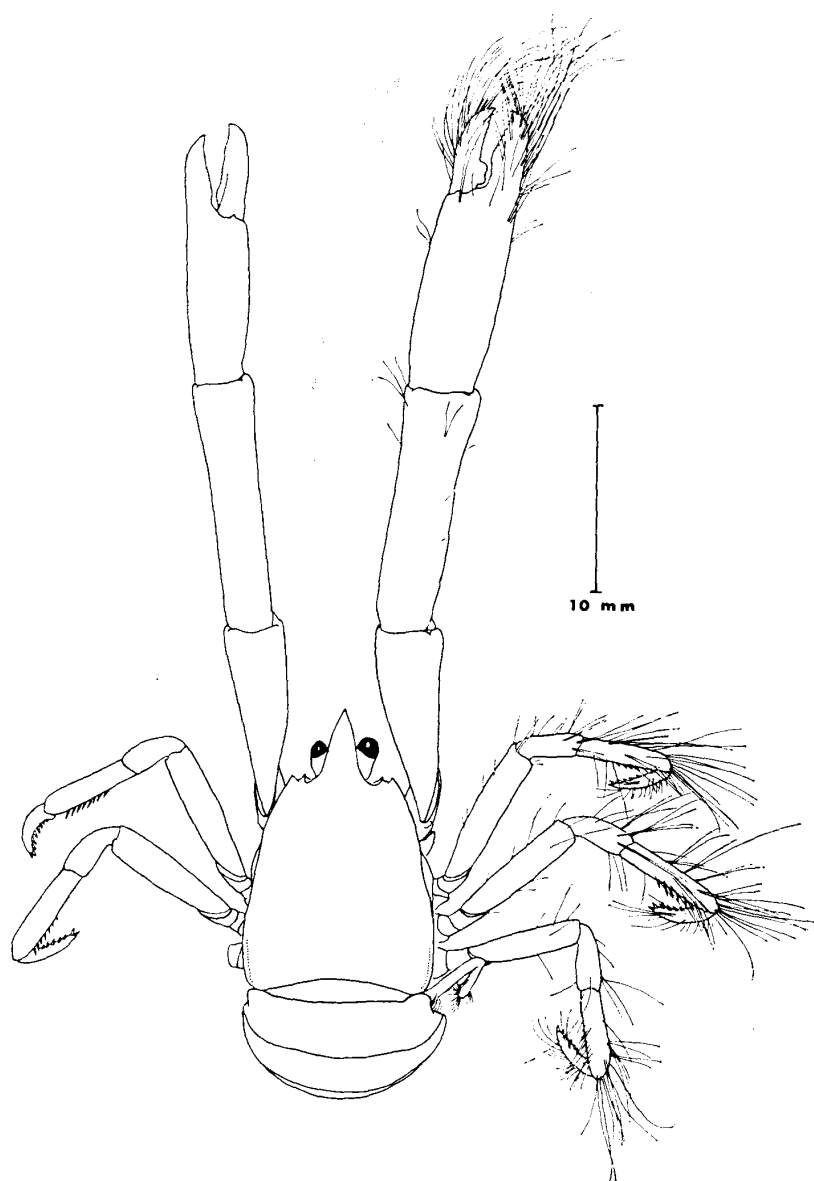


Fig. 7. *Uroptychus similis* sp. nov., holotype, dorsal view, setae on left appendages omitted.

the 3rd thoracic sternite with a median pair of process on the anterior margin. Due to the brevity of the original description of *U. indicus*, one of the syntypes, 9328/9, was borrowed for comparison from the Zoological Survey of India through Dr. K. K. TIWARI. The differences detected between *U. indicus* and the new species are enumerated below.

	<i>U. similis</i>	<i>U. indicus</i>
Rostrum	sharply triangular	somewhat wider
Antennal scale	broader than peduncle	as long as peduncle
Ischium of cheliped	with small thin knob	with distinct spine
Palm of cheliped	fully twice as long as dactylus	barely 1.5 times as long as finger
Walking legs	with long coarse setae on distal 2 segments	almost devoid of long setae
Diameter of ovum	1.5 mm	0.9 × 1.1 mm

From another relative, *U. nitidus occidentalis*, the new species may be distinct in the following: 1) A pronounced dorsal spine is present on the ischium of the cheliped in *U. nitidus occidentalis* instead of a small thin knob in the new species; 2) the antero-lateral angle of the carapace is spined in *U. nitidus occidentalis*, while it is, as illustrated,

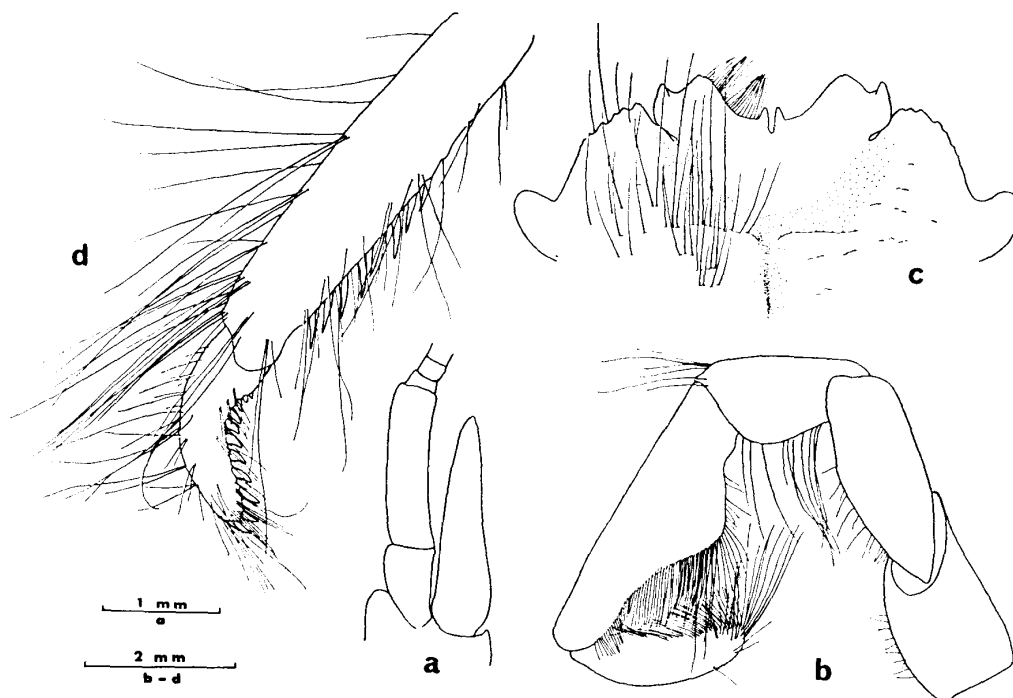


Fig. 8. *Uroptychus similis* sp. nov., holotype; a, left antennal peduncle, ventral view; b, endopod of left 3rd maxilliped; c, anterior part of sternal segments; d, distal segments of left 1st walking leg.

basally greatly broadened and not distinctly spined in *U. similis*; 3) the distal 2 segments of walking legs have longer coarse setae in *U. similis*.

Eumunida debilistriata sp. nov.

(Fig. 9)

Material. Holotype: male, NSMT-Cr. 4360, off Midway I., 32–35° N, 172°45'–172°50' W, 700–800 m deep, March–May 1972, coll. Nippon Suisan Co. Ltd.

Description of holotype. Carapace wider than long, exclusive of rostrum. Gastric region distinctly convex, only feebly striated, with 3 epigastric spines on each side, innermost more or less pronounced. Cervical groove present but indistinct on extremity. Small spine equivalent to β of GORDON (1930) present on hepatic region. Incomplete striae on posterior half of carapace; posterior transverse ridge not interrupted. Lateral margins convex at posterior 3rd; anterolateral spine well developed, accompanying behind 2 spines just in front of ordinary end of cervical groove, and 5 (left) or 6 (right) on branchial region.

Outer angle of orbit produced but not spined.

Rostrum spiniform, broken at tip, basally convex. Anterior supraorbital spine larger than posterior.

Second abdominal segment with 3 transverse grooves rather distinctly ridged; pleural process characteristic of genus. Striation of 3rd segment similar to that of 2nd, posteriormost groove much weaker; 4th and 5th segments each with 2 distinct groove but not ridged.

Antennal peduncle composed of 5 segments and antennal scale; all segments spinous; 2nd segmental spine overreaching 3rd but falling short of 4th segment; antennal scale spiniform, ending in distal margin of 3rd segment; 3rd segmental spine greatly developed, reaching tip of preceding segmental spine; 4th segment with 3 terminal spines, outermost largest.

Merus of 3rd maxilliped setose only internally, with inner median marginal spine of rather reduced size, and tubercular tooth on dorso-terminal margin. Carpus unarmed.

Anterior part of sternal segments as illustrated. Anterior margin of 3rd thoracic sternite with median pair of spines moderately developed. Lateral spine on following sternum reduced to tubercular process.

Left cheliped more than 3 times as long as carapace, cylindrical, spinose, sparsely setose distally. Right cheliped missing. Spination of arm prominent especially internally, arranged in 4 rows: ventral row of 16 spines, inner marginal of 15, outer-dorsal of 16, inner dorsal of 12. Wrist 1/3 of palm length, with 1 distal ventral, 2 large inner marginals, 6 dorsals, 5 outer marginals, and 2 small dorsals nearer anterior part of inner margin. Palm devoid of ventral pad, 7.4 times as long as broad, with 2 rows of spines; dorsal row of 12 spines distally nearing inner margin, inner marginal row of 10 stout spines also nearing ventral surface distally. Fingers more than half

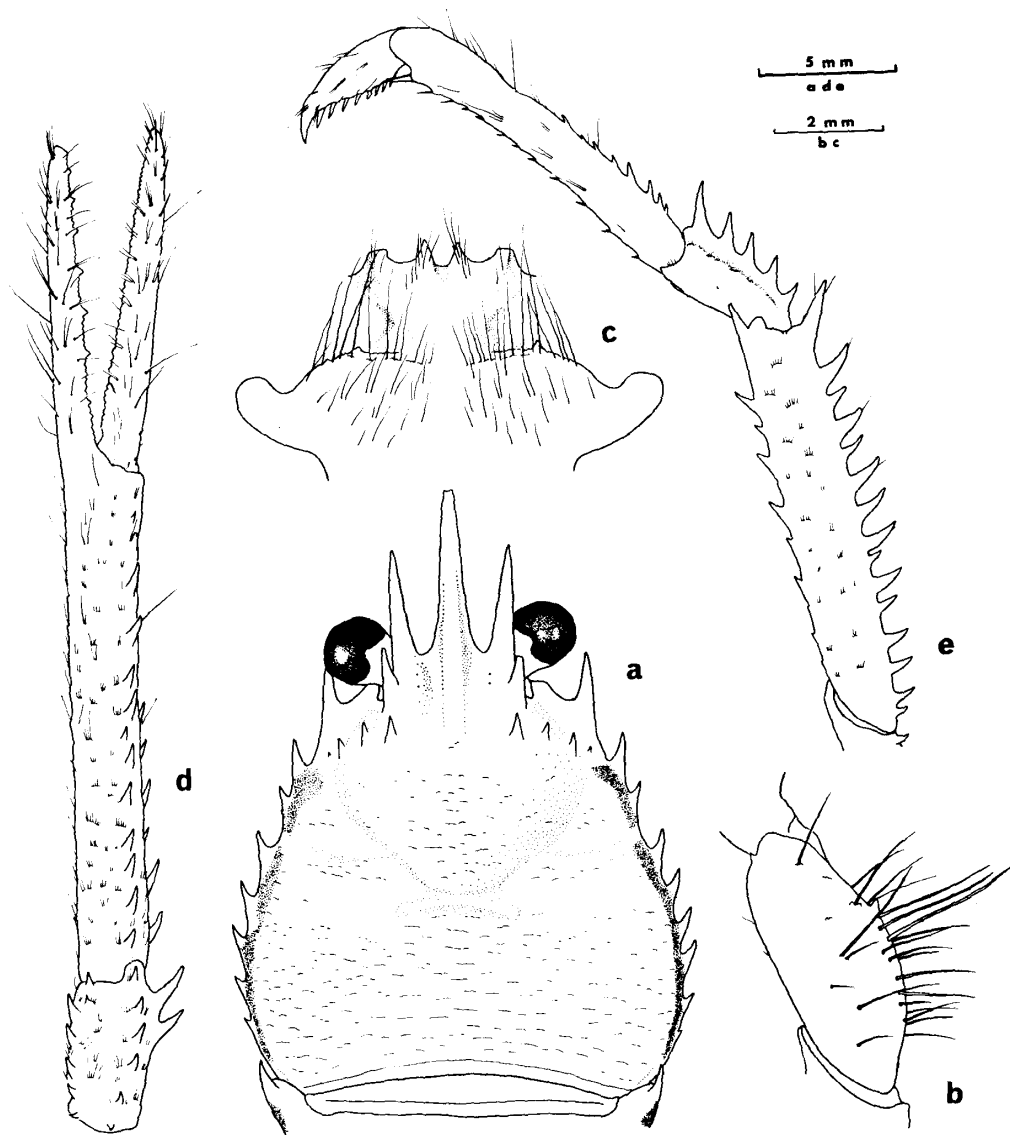


Fig. 9. *Eumunida debilistriata* sp. nov., holotype; a, carapace, dorsal view; b, merus of right 3rd maxilliped; c, anterior part of sternal segments; d, left chela, dorsal view; e, left 1st walking leg.

of palm, sparsely setose, not gaping, touching each other with tubercular teeth; more or less pronounced tubercular teeth present equidistantly on cutting edge among usual small tubercular teeth; tip broken, probably curving inward.

Walking legs moderately depressed; merus of 1st leg much stouter, slightly scaly dorsally, with 15 stout outer marginals, 9 ventro-outer marginals and 8 inner marginals; last decreasing in size proximally; carpus with 7 outer marginal spines; propodus slightly curving inward, with 6 outer marginal spines proximally and 12 inner marginal spinelets; dactylus less than half of propodus length, curving inward, inner margin serrated;

9 movable spinelets arising from serrae. Second walking leg similar to 1st, but merus shorter and wider; number of outer ventrals reduced to 2. Merus of 3rd leg shorter than and as wide as that of 2nd; 14 outer marginals strong on distal 2/3, small on proximal 3rd; 5 minute dorsal spines nearer outer proximal spinules; 9 (left) or 10 (right) small dorso-mesial spines.

Measurements of holotype (mm).

Length of carapace	22.7+
Breadth of carapace	17.1
Length of cheliped	78.2+ (left)
Length of wrist	6.3
Length of palm	19.3
Breadth of palm	2.6
Length of finger	13.7+

Remarks. This new species belongs to the group B of GORDON (1930). The closest relatives having the long palm with a ventral pad of densely packed hairs are represented by 2 species, i.e., *Eumunida dofleini* GORDON known from Japan and *E. laevimana* GORDON from the Lesser Sunda Islands. The new species is easily distinguished from these by having very weak striation of the carapace and the paired median process of the 3rd thoracic sternite.

References

- ALCOCK, A., 1901. A Descriptive Catalogue of the Indian Deep-sea Crustacea Decapoda Macrura and Anomala in the Indian Museum. 286+iv pp., pls. 1-3. Calcutta.
- & A. R. S. ANDERSON, 1899. Natural history notes from H. M. Royal Indian Marine Survey Ship "Investigator" commander T. H. HEMING, R. N., commanding. Series III, No. 2. An account of the deep-sea Crustacea dredged during the surveying season of 1897-98. *Ann. Mag. nat. Hist.*, (7), 3: 1-27.
- BABA, K., 1977. A new species of *Uroptychus* (Crustacea, Anomura, Chirostylidae) from off Honshu, Japan. *Annot. zool. Japon.*, 50: 123-126.
- FAXON, W., 1893. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander AGASSIZ, carried on by the U. S. Fish Commission Steamer "Albatross" during 1891.... VI. Preliminary descriptions of new species of Crustacea. *Bull. Mus. Comp. Zool. Harvard Univ.*, 24: 149-220.
- GORDON, I., 1930. On the species of the galatheid genus *Eumunida* (Crustacea, Decapoda). *Proc. zool. Soc. Lond.*, 1929: 741-753.
- TIRMIZI, N. M., 1964. Crustacea: Chirostylidae (Galatheidea). *Sci. Rept. John Murray Exp.* 1933-34, 10: 385-415.